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# A Sensor and Communications System for Containerized-Cargo Security

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## ABSTRACT

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# A SENSOR AND COMMUNICATIONS SYSTEM FOR CONTAINERIZED-CARGO SECURITY

A public/private collaboration between federal, state, provincial, and local U.S. and Canadian governmental organizations, called the Canada – United States Cargo Security Project has been formed, with the goal to improve security of containerized cargo moving from overseas locations into eastern Canadian provinces and the Northeastern United States. The current phase of this project has two technical objectives. These are: (1) to build and test a prototype in-container sensor system able to detect unauthorized entry into the container and the presence of radioactive material, to record geographical location and environmental data, and to transmit this information via satellite communications to a remote monitoring facility, and (2) to develop a secure website where data from the in-container sensors and other information will be displayed in real or near-real time and can be made available to law enforcement and emergency response organizations as appropriate. This paper will describe these activities, currently being undertaken by the Lawrence Livermore National Laboratory. An additional goal of the project's current phase is to integrate multi-jurisdictional training and first-responder exercises while monitoring and tracking container shipments from overseas to the US via Canadian ports-of-entry into North America. This activity is being undertaken by other project partners, which include the National Infrastructure Institute – Center for Infrastructure Expertise (NI2CIE), Transport Canada, Canadian Provinces of Quebec and Nova Scotia, Ports of Halifax and Montreal, U.S. Coast Guard (First Coast Guard District), States of New Hampshire, Maine, Vermont, and New York and the Port of Portland.

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Richard R. Leach Jr. (leach1@llnl.gov) received his B. S. degree in electrical engineering and computer science from the University of California, Berkeley in 1991. He is currently holds a position as a signal and image processing research engineer at Lawrence Livermore National Laboratory and is lead research investigator for the sensor and communications system for containerized-cargo security project. His research interests encompass ultra-wideband (UWB) radar, intrusion detection security systems, through wall radar imaging, ultrasonic breast imaging, ground motion modeling using artificial intelligence, artificial vision, image processing for ground penetrating radar, distributed networks of wireless sensors, and beam forming radar. He is a member of the American Geophysical Union and a senior member of IEEE.

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